United States Patent [19]

Sapru et al.

[11] **Patent Number: 4,623,597**

[45] **Date of Patent: * Nov. 18, 1986**

[54] **RECHARGEABLE BATTERY AND ELECTRODE USED THEREIN**

[75] Inventors: **Krishna Sapru**, Troy; **Benjamin Reichman**; **Arie Reger**, both of Birmingham; **Stanford R. Ovshinsky**, Bloomfield Hills, all of Mich.

[73] Assignee: **Energy Conversion Devices, Inc.**, Troy, Mich.

[*] Notice: The portion of the term of this patent subsequent to Dec. 11, 2000 has been disclaimed.

[21] Appl. No.: **801,545**

[22] Filed: **Nov. 25, 1985**

Related U.S. Application Data

[63] Continuation of Ser. No. 614,273, May 25, 1984, abandoned, which is a continuation of Ser. No. 372,693, Apr. 28, 1982, abandoned.

[51] **Int. Cl.**[4] **H01M 4/02**; H01M 10/36

[52] **U.S. Cl.** **429/101**; 429/209; 429/218; 429/223; 420/900

[58] **Field of Search** 429/209, 218, 101, 57, 429/40, 223; 420/900

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,669,745	6/1972	Beccu	429/218
3,824,131	7/1974	Beccu	429/223
3,874,928	4/1981	Will	429/57
3,980,501	9/1976	Feder et al.	429/218
4,107,405	8/1978	Buegen et al.	429/218
4,216,274	8/1980	Bruning et al.	429/101
4,430,391	2/1984	Ovshinsky et al.	429/40
4,431,561	2/1984	Ovshinsky et al.	420/900
4,487,818	12/1984	Ovshinsky et al.	429/44

Primary Examiner—Donald L. Walton

Attorney, Agent, or Firm—James D. Ryndak; Lawrence G. Norris; Richard M. Goldman

[57] **ABSTRACT**

An improved battery utilizing a hydrogen rechargeable anode of a disordered non-equilibrium multicomponent material including one or more elements forming a host matrix and at least one modifier element incorporated therein. The anode is capable of electrochemically absorbing hydrogen from an electrolyte during application of a charging current thereto. The hydrogen is stored in the anode bulk until discharge is initiated, whereupon an electrical current is produced when the hydrogen is released. The superior battery of the invention has attained high density energy storage, efficient reversibility, high electrical efficiency, bulk hydrogen storage without structural change or poisoning and hence long cycle life and deep discharge capability.

32 Claims, 6 Drawing Figures